Stucco on Solid Base

Prepared For

The Masonry Workshop

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FLORIDA LATH & PLASTER BUREAU

MASONRY ASSOCIATION OF FLORIDA, INC.
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Building a Better Florida with Masonry
STRENGTH • BEAUTY • DURABILITY

This is a 45 Minute Webinar

This session :

Review the BASIC RULES for stucco applied on a SOLID BASE MATERIAL to assure that the stucco will meet the Code Standards and will perform well.

KEY THOUGHT: Ensure PERFORMANCE

What are the Rules?

* **Florida Building Code 7th Ed (2020)**

ASTM C 926 - 18b

ASTM C 1063 – 19a

ASTM C 932 – 06 (2016)

ASTM C 847 – 14a

ASTM C 897 - 05

ASTM C 1787 - 14 (2019)

ASTM C 1861 - 18

ASTM C 1860 - 19

ASTM standards are not a scope of work

KEY THOUGHT: Ensure PERFORMANCE

The 2020 Florida Building Code

The Florida Building Code at 2510.3 refers the reader to:

ASTM C926 "*Standard Specification for Application of Portland Cement Based Plaster*"

ASTM C1063 "*Standard Specification for installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster*"

ASTM C 932 "*Standard Specification for* ***Surface-Applied*** *Bonding Compounds for* ***Exterior Plastering***"

ASTM C 897 "*Standard Specification for Aggregate for Job-Mixed Portland Cement-Based Plasters*"

Referenced Standards within the Code are considered part and parcel of the code.

KEY THOUGHT:
Ensure PERFORMANCE

This session will cover:

A. Defining Solid Base

B. Understanding the Problem

C. Evaluating the Problem

D. Eliminating the Problem

A. Define Solid Base

Section 3.2.27 of ASTM C 926 - solid plaster base, n- Substrates that do not require lath, include:

A. cast in place and precast concrete,
B. concrete and stone masonry,
C. clay brick and tile.

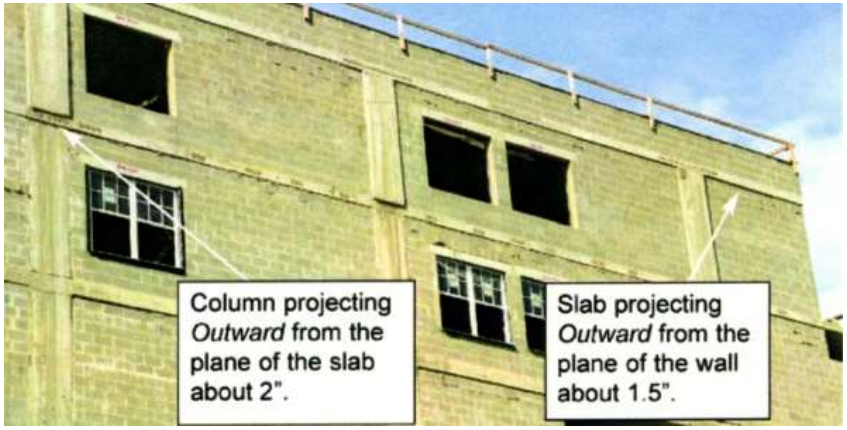
The key is Absorption!
Pre-wet the substrate!

B. Understanding the Problem

The <u>three primary problems</u> with stucco application on solid substrates are:

1. Cracking

2. Debonding/Delaminating



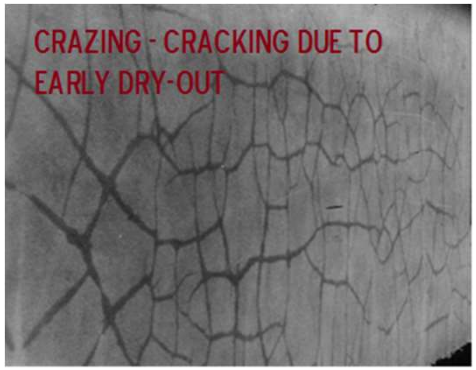
3. Substrate out of Tolerance (out of alignment)

Cracking

First of four slides on Cracking

Assessing Cracking:

- ✓ **ACI 524R Guide to Portland Cement-Based Plaster**
- ✓ **PCA Portland Cement Plaster (Stucco) MANUAL**



ACI @ 14.2 classifies cracks as follows:

14.2.2 *Shrinkage cracks, check cracks, and craze cracks*—Result from volume loss (water)

- Reversible
- Self-sealing
- Primarily cosmetic – Visible after rain of heavy dew
- More noticeable on smoother finishes
- **Do not extend through all plaster coats**
- Not considered a failure of the plaster system
- Easily remedied

NOTE in section D we will discuss means to eliminate or minimize these cracks.

KEY THOUGHT: Ensure PERFORMANCE

Cracking

Second of four slides on Cracking

Assessing Cracking:

- ✓ **ACI 524R Guide to Portland Cement-Based Plaster**
- ✓ **PCA Portland Cement Plaster (Stucco) MANUAL**

PCA Manual @ page 25 discusses cracks as follows:

16. Plaster Cracks in craze pattern and is convex. Brown coat is harder than scratch coat or finish coat harder than base coat.

18. Cracking due to poor consolidation.

20. Cracking due to early moisture loss.

ALSO: Failure to wet the substrate prior to plastering!

NOTE in section D we will discuss means to eliminate or minimize these cracks.

KEY THOUGHT: Ensure PERFORMANCE

Cracking

Third of four slides on Cracking

Assessing Cracking:

The ACI 524R Guide to Portland Cement-Based Plaster

Structural movement cracks or tensile stress cracks:

- ➢ **Significant cracks that either**
  - ✓ **Extend through the entire thickness of a plaster or**
  - ✓ **Through the delaminated or debonded portion of a plaster coating.**
- **Follow the stress pattern that the crack relieved.**
- **Tend to be long and straight and**
- **May extend across multiple panels or sections.**
- **A single structural crack can relieve the stress of an area.**
- **Continue growing in length, width, or number until movement stops in the underlying structure or structural member.**

NOTE: Remediation will be discussed in section D

KEY THOUGHT: Ensure PERFORMANCE

Cracking

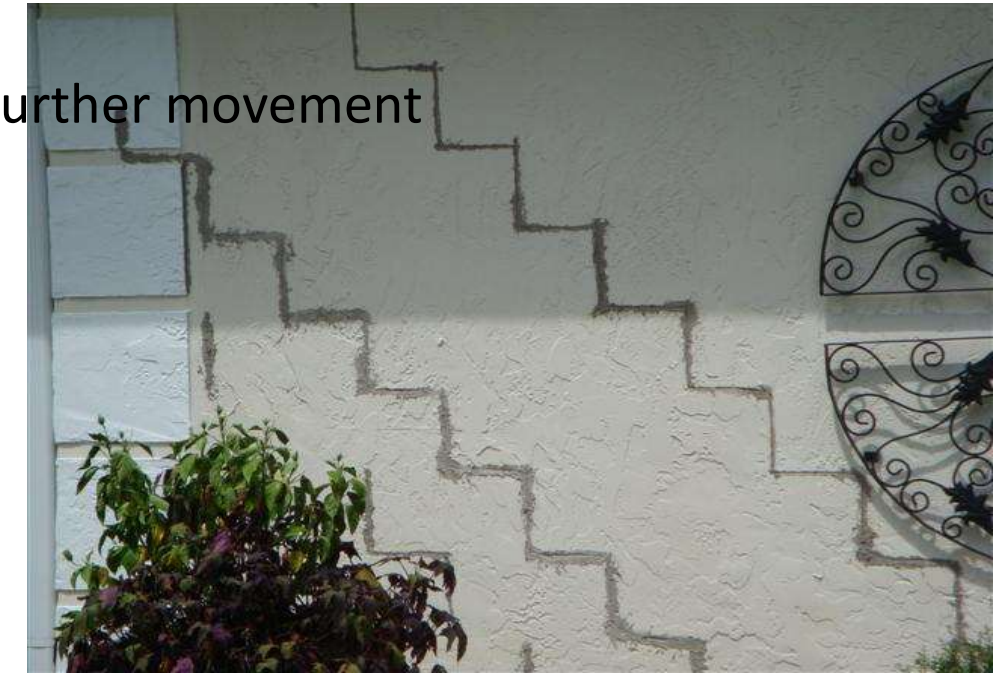
Fourth of four slides on Cracking

Structural movement cracks or tensile stress cracks

Active - result of ongoing structural movement or fluctuating tensile strain continually open, close, slide, lift, or lower the plaster along the fracture

Static or Inactive - do not exhibit further movement

Both can be repaired



Debonding/Delamination

First of four slides on Debond/Delam

surface.

A plaster coating that has achieved proper mechanical bond will generally maintain that bond throughout the service life of the plaster. A proper mechanical bond is created

S L I D E the HAMMER
Never
HAMMER THE HAMMER

SMALL
4 OZ HAMMER

Base too dry, Lack of hydration.

" @14.0 Surface too smooth or dense.

" @15. 0 Surface covered with dirt or other contaminant.

NOTE in section D we will discuss means to eliminate or minimize these problems.

KEY THOUGHT: Ensure PERFORMANCE

Debonding/Delamination

Second of four slides on Debond/Delam

Assessing Debonding/Delamination

ACI 524R @ 14.4: Debonding & delamination:

14.4.1 *General*—Debonding and delamination are both separations.

- Debond - separation between a coat of plaster and the substrate
- Delamination - separation between plaster coats
  - Most often the nominal 1/8 in. finish coat.

PCA Portland Cement Plaster (Stucco) MANUAL @ page 35

Lack of bond to concrete or masonry:

Surface is too smooth or too dense to absorb cement paste.	Use open or rough surface masonry units. Use dash bond coat, bonding agent or metal lath.
Surface covered with cement dust, dirt or other foreign material or block treated with water-proofer .	Clean walls of contaminants
Brown coat not applied with enough pressure to form mechanical key or bond; or applied with slicker.	Use trowel for brown coat and apply pressure to force stucco into pores in masonry.

KEY THOUGHT: Ensure PERFORMANCE

Debonding/Delamination

Third of four slides on Debond/Delam

Assessing Debonding/Delamination
ACI 524R @ 14.4: Debonding & delamination:

Causes:

1. **Surface carbonation on the undercoat or on a solid substrate.**
2. **Surface efflorescence or laitance on an undercoat or solid substrate.**
   - Laitance and efflorescence must be removed.
3. **Too smooth or dense solid substrate surface or undercoat.**
   - Block for stucco must be “ROUGH”.
4. **Too dry a solid substrate or undercoat having a high rate of absorption.**
   - Results in rapid moisture loss from the fresh plaster
   - Substrate must be dampened to be:“ Saturated Surface Dry”.
5. **Too wet a solid substrate or undercoat**
   - Wait for moisture to absorb into the substrate

NOTE: in section D we will discuss means to eliminate or minimize these problems.

KEY THOUGHT: Ensure PERFORMANCE

Debonding/Delamination

Fourth of four slides on Debond/Delam

Assessing Debonding/Delamination

ACI 524R @ 14.4: Debonding & delamination:

Causes (cont.):

6. **Plaster Coat too thin.**
   - Plaster has little tensile and flexural strength
7. **Contaminants on the surface such as form release agents, oil, dirt, etc…**
8. **Improper scratch coat or unscuffed brown coat.**
9. **Improper usage or application of a bonding agent (BA).**
   - Must meet ASTM C 932 for Surface-Applied
   - ACRYLIC: Stucco must be applied while BA is "tacky". If it dries out, it becomes a DE- BONDER.
   - PVA – Poly Vinyl Acetate – will re-emulsify if moisture gets to it after it has dried out and it will "release" the stucco.

NOTE: in section D we will discuss means to eliminate or minimize these problems.

KEY THOUGHT: Ensure PERFORMANCE

3. Substrate out of Tolerance (out of alignment)

First of one slide on Out of Tolerance

Assessing Out of Tolerance/Out of alignment problem

Background:

Most popular design for high rise office and multistory condominiums –

Poured-in-Place Concrete with Masonry infill

Out of plumb, plane or dimension – ACI 117, 318

Results in too much or too little plaster thickness

ICFs

Insufficiently braced ICF walls can vary from plane both vertically and horizontally

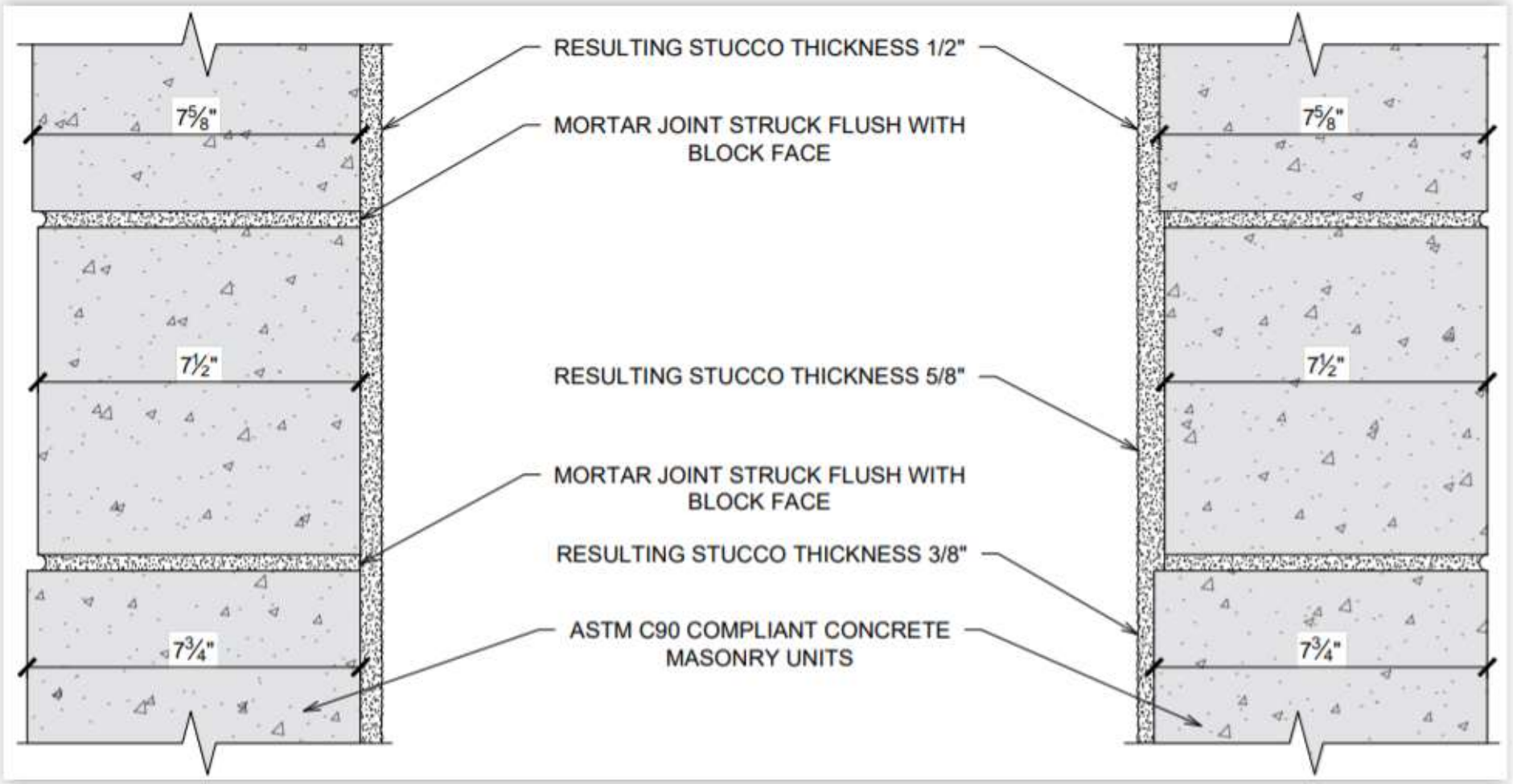
ASTM C 926 @ Table 4 limits stucco thickness to ½ or ⅝".

- **Significant changes in thickness result in CRACKING!**
- **Exceeding the thickness in Table 4 requires an engineered design**

NOTE: in section D we will discuss means to eliminate or minimize these problems.

KEY THOUGHT: Ensure PERFORMANCE

3. Substrate out of Tolerance (out of alignment)

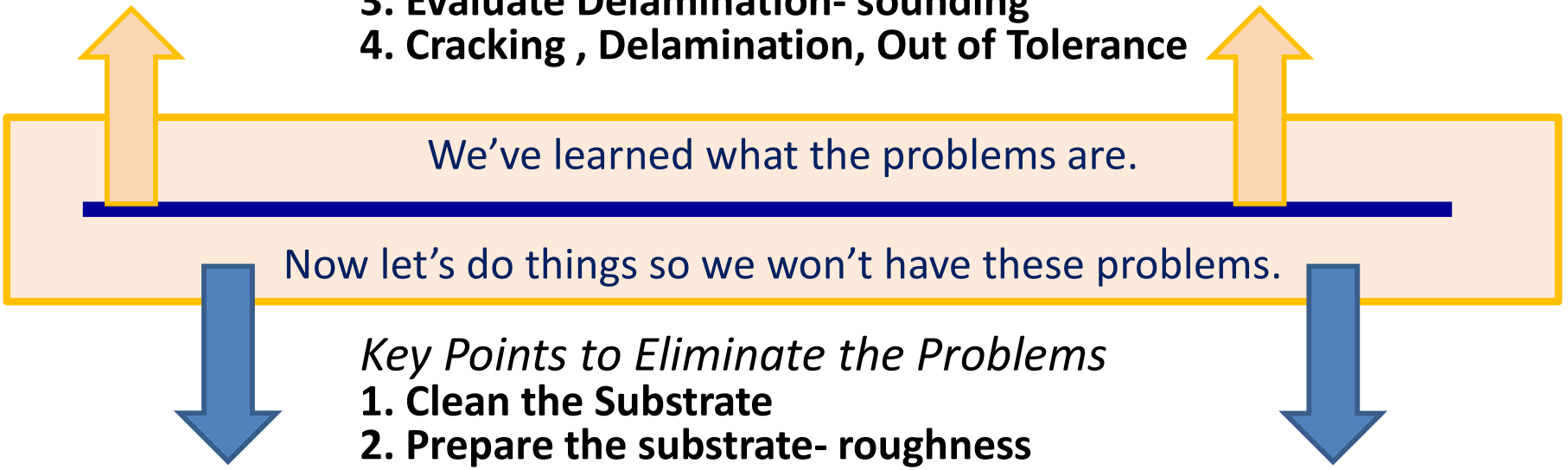


Defining Solid Substrate

Understanding the Problem

Key Review Points to Evaluate the Problem:

1. Examine the Substrate -
2. Evaluate Cracking
3. Evaluate Delamination- sounding
4. Cracking , Delamination, Out of Tolerance



Key Points to Eliminate the Problems

1. Clean the Substrate
2. Prepare the substrate- roughness
3. Bonding agent
4. Integral Admixture
5. Proper Mixing Sequence
6. Proper Application – damp & pressure
7. Plan the work that can be accomplished each day. –
8. Curing
9. Maintenance Bulletin

Now let's do things so we won't have these problems.

Key Points to Eliminate the Problem

1. Clean the Substrate
2. Prepare the substrate- roughness
3. Dash Bond Coat or Surface-applied Bonding Agent; or
4. Integral Admixture
5. Proper Mixing Sequence
6. Proper Application – damp & pressure
7. Plan the work that can be accomplished each day.
8. Curing
9. Maintenance Bulletin

Key Points to Eliminate the Problems

First Two of Nine Points

1. Clean the Substrate
2. Prepare the substrate- roughness

ASTM C 926 @ 5.0

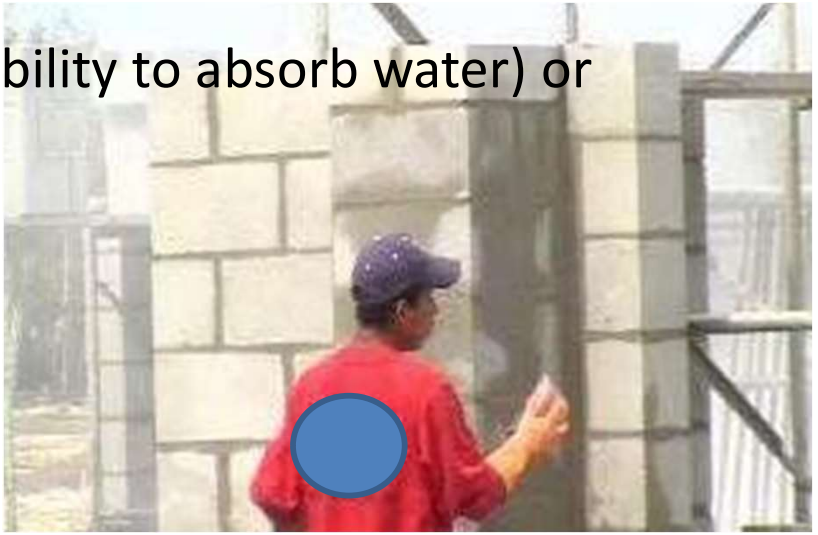
Requirements for Bases to Receive Portland Cement-Based Plaster

6.2 Solid bases to receive plaster shall be:

- ✓ Straight and true within 1⁄4 in. in 10 ft
- ✓ Free of form oil or other elements, which would interfere with bonding. **DO NOT SPONGE THE BLOCK! CAUSES DEBONDING.**

Out of tolerance Conditions shall be corrected prior to plastering.

6.2.1 Solid surfaces shall have the suction (ability to absorb water) or surface roughness, or both.



Key Points to Eliminate the Problems

First Two of Nine Points

1. Clean the Substrate
2. Prepare the substrate- roughness

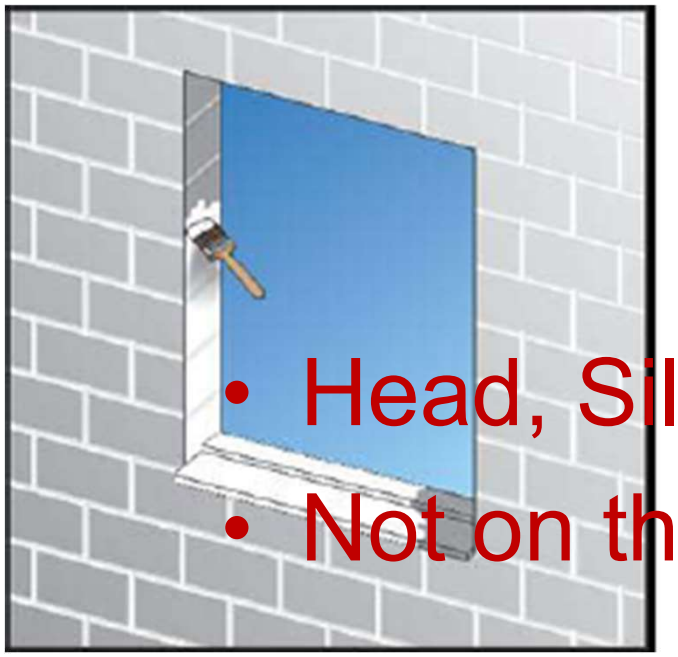
6.2.2 Smooth or nonabsorbent solid surfaces…shall be prepared…by one of the following methods:

6.2.2.1

a) Sandblasting,
b) wire brushing,
c) acid etching, or
d) chipping or
e) a combination thereof.

KEY THOUGHT: Ensure PERFORMANCE

Liquid Applied Barriers



- Head, Sill & Jamb only
- Not on the block face!

FMA/AAMA

The CMU water resistant coating shall be applied …before the installation of buck/receptor materials. This application may include portions of the exterior masonry surface, to form one contiguous sealed area, but the coating shall not interfere with adhesion of the stucco or other cladding.

If All Else Fails…

6.2.3 Where bond cannot be obtained by one or more of the methods in 6.2.2, a furred or self-furring metal plaster base shall be installed in accordance with Specification C1063….

#5 of Nine Points

5. Proper Mixing Sequence

The following sequence for mixing is to be used:

1. Add most of the water
2. Add the first ½ of the Sand
3. Add the cement
4. Add the second ½ of the sand
5. Add water (if needed) to get to the correct workability.
6. Mix for 5 minutes after all the ingredients are in the mixer.

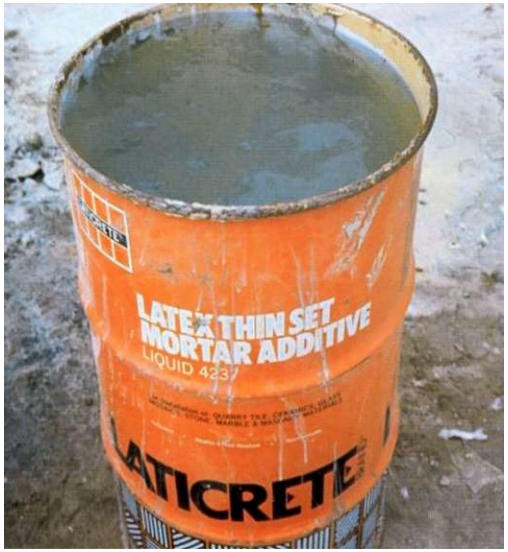
Note: Over mixing causes too much air entrainment . Do not over-mix. Maintain mixer in continuous operation while charging mixer.

Key Points to Eliminate the Problems

#5 of Nine Points

5. Proper Mixing Sequence + mixing the liquid portion with admixture

How to always have the right amount of admixture in the liquid.
Always use a 55 gallon barrel:



Water: Potable, cool and free from impurities.

Base coat(s):
a. ASTM C 926 Plaster Mix Base Coat :
c. ***Add ASTM C 932 compliant Admixture to the liquid portion of the base-coat cement plaster at a rate of 1 gallon Admixture to 2 gallons water.***
1. The procedure for mixing the correct amount of 932 Admixture follows:

- ***a. Obtain a clean 55 gallon barrel for the mixing liquid.***
- ***b. Add one 5 gallon pail of 932 Admixture***
- ***c. Add two 5 gallon pails of water***

Repeat the steps b and c for a total of <u>three</u> times.

At that point, the barrel will contain: 15 gallons of 932 Admix and 30 gallons of water for a total of 45 gallons. (Thus 1/3 (15 gal) is Admix and 2/3 (30 gal) is water)

All of the liquid going into the stucco should come out of the barrel and the process will assure that 1/3 of the liquid will always be Admix.

As the barrel gets somewhat low, it should be replenished using the same procedure above , i.e. always placing one five gallon 932 Admix into the barrel and then adding two each 5 gallon pails of water. Never pour water into the barrel from the hose.

KEY THOUGHT: Ensure PERFORMANCE

Key Points to Eliminate the Problems

6. Proper Application – Damp & Pressure

#6 of Nine Points

ASTM C 926 @ 7.0 Application:

7.3.1 – Apply to ***nominal*** thickness in Table 4, i.e. ½" or ⅝" on SOLID substrates.

Dampen the Substrate:

7.5.1 – Wet Solid Bases just to the point of runoff and let soak in.

Apply with Pressure:

7.5.2.1 - The first (scratch) coat shall be applied with sufficient material and pressure (No slickers – use the trowel).

- The vertical surfaces shall be scored horizontally.

7.5.2.2 - The second (brown) coat shall be applied with sufficient material and pressure (again – No slickers).

KEY THOUGHT: Ensure PERFORMANCE

#7 of Nine Points

7. Plan the work that can be accomplished each day

Accessories

- Mostly not necessary but can be useful as depth gauge or screed
- Often provide leak points

Cornerbead not needed – use strip-forming
Plasterstop with backer rod & sealant needed to isolate penetrations and openings (pipes, doors, windows, etc…)

Control Joints: 1 piece
Only over a joint in the solid base or where dissimilar materials abut (cmu/frame).
Do not function as such when placed in direct-applied stucco.

Expansion Joints: 2 or more pieces
Only over a joint in the solid base.
Can be affixed on both sides to the solid base.

Key Points to Eliminate the Problems

#7 of Nine Points

7. Plan the work that can be accomplished each day

Avoid cold joints in the field of the plaster.

Start and stop at corners or joints where possible

Avoid cuts or grooves – plaster thickness may be compromised

Ornamental bands should be placed over the brown coat

EXTRA ACCESSORIES ARE AN INVITATION TO WATER INTRUSION – AVOID THEM !

Key Points to Eliminate the Problems

#7 of Nine Points

7. Plan the work that can be accomplished each day

Plan to use the Double-Back or Double-Up method

Apply the brown coat to the scratch while still damp (thumb-print hard)

- Promotes monolithic growth between the coats
- Promotes uniform hydration (curing) of the two coats
- Works well over solid bases

KEY THOUGHT: Ensure PERFORMANCE

Key Points to Eliminate the Problems

#8 of Nine Points

8. Curing

Hydration

- Water is the catalyst for the chemical reaction
- Plaster coats are too thin to maintain moisture content
- Moisture must be augmented
  - ✓ Fogging
    - **Prior to plastering!** More important than after.
    - 2X -3X per day for several days
    - Weather conditions will affect the need for fogging
  - ✓ Drape protection – plastic, wet burlap, etc…
- Reduces the pH of the plaster
- Increases the strength gain

Dry & Windy conditions are worse than high temperature!

KEY THOUGHT: Ensure PERFORMANCE

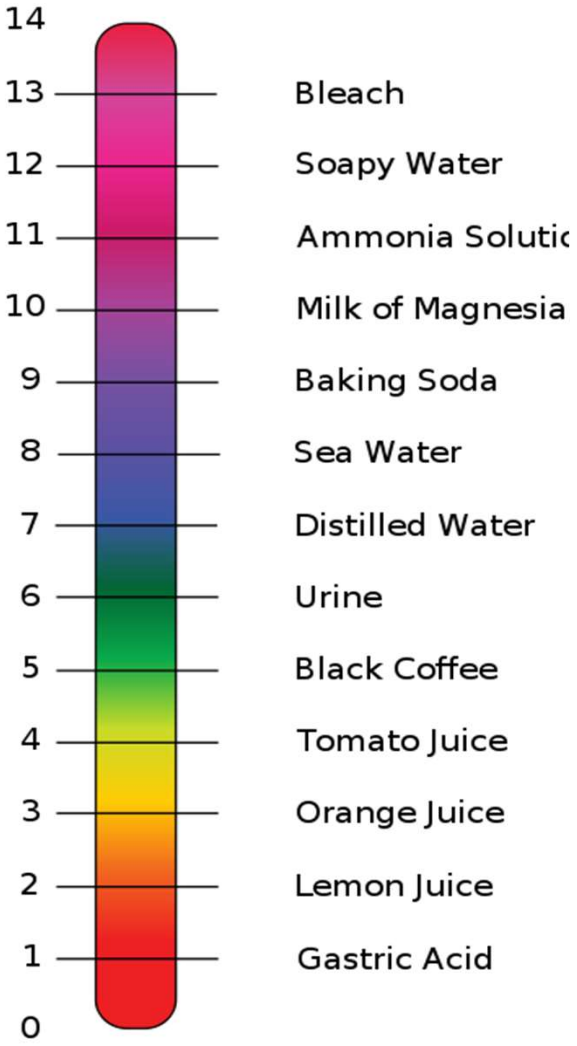
Key Points to Eliminate the Problems

#8 of Nine Points

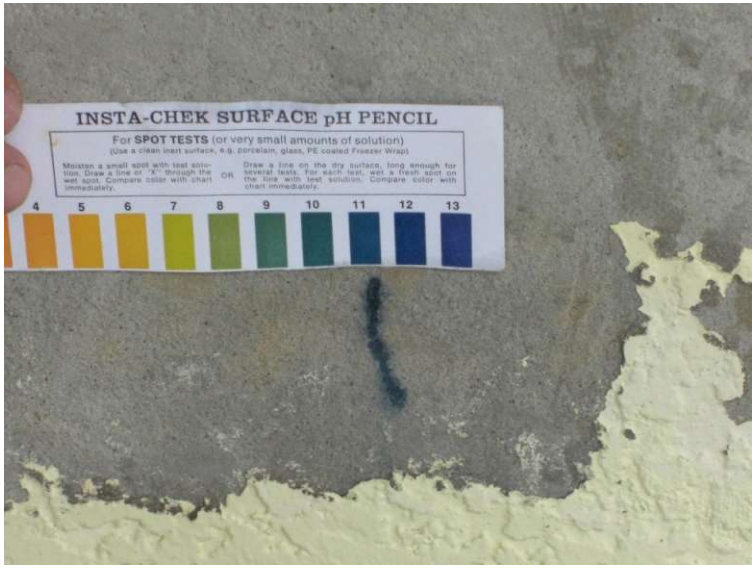
8. Curing

Benefits of Bonding Agent – as an integral admix.

- Improved Water Resistance
- Improved Density
- Reduce Cracking
- Reduced H_2O permeability
- Increased Strength
- **IMPROVED CURING**
- Increased Durability



9. Painting



KEY THOUGHT: Ensure PERFORMANCE

Key Points to Eliminate the Problems

#9 of Nine Points

9. MAINTENANCE

FLORIDA LATH & PLASTER BUREAU

All buildings require maintenance. Stucco requires maintenance. Maintenance should commence when the stucco work is completed.

Florida Lath and Plaster Bureau has developed this maintenance guide.

Technical Bulletin

TB-ST-04-12

Stucco & Building Exterior Maintenance

What you should do! Page 1 of 3

Wash your stucco as needed to keep its surface clean and bright. Follow the instructions below for general, light, maintenance cleaning. For moderate to heavy cleaning, you may want to choose one of the more aggressive methods described in ASTM E 1857, "Standard Guide For Selection of Cleaning Techniques for Masonry, Concrete and Stucco Surfaces," available from www.astm.org

Painted Surfaces: Always check the paint manufacturer's specifications and recommendations before using any detergent, cleanser, bleach or other chemical on painted areas. However, in most cases the procedures laid out below should be acceptable.

Pre-wet: Use a garden hose with a jet nozzle to pre-wet the wall over the entire surface. Pre-wetting will overcome a possible absorption problem and will prevent the stucco from absorbing dirty wash water. Set the nozzle to a medium to coarse spray. Start at the bottom and work your way to the top.

KEY THOUGHT: Ensure PERFORMANCE

This is a 45 minute Webinar

Purpose of this Webinar

To review the BASIC RULES for stucco applied on a SOLID BASE MATERIAL to assure that the stucco will meet the Code Standards and will perform well.

KEY THOUGHT: Ensure PERFORMANCE